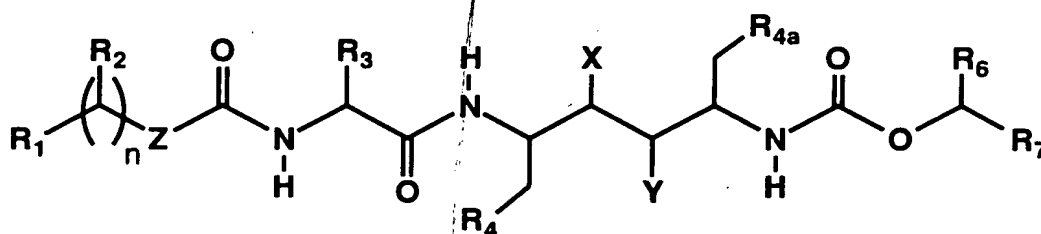


# CLAIMS

What is claimed is:

1. A compound of the formula:



wherein  $R_1$  is monosubstituted thiazolyl, monosubstituted oxazolyl, monosubstituted isoxazolyl or monosubstituted isothiazolyl wherein the substituent is selected from (i) loweralkyl, (ii) loweralkenyl, (iii) cycloalkyl, (iv) cycloalkylalkyl, (v) cycloalkenyl, (vi) cycloalkenylalkyl, (vii) heterocyclic wherein the heterocyclic is selected from aziridinyl, azetidiny, pyrrolidinyl, piperidinyl, piperazinyl, morpholinyl, thiomorpholinyl, thiazolyl, oxazolyl, isoxazolyl, isothiazolyl, pyridinyl, pyrimidinyl, pyridazinyl and pyrazinyl and wherein the heterocyclic is unsubstituted or substituted with a substituent selected from halo, loweralkyl, hydroxy, alkoxy and thioalkoxy, (viii) (heterocyclic)alkyl wherein heterocyclic is defined as above, (ix) alkoxyalkyl, (x) thioalkoxyalkyl, (xi) alkylamino, (xii) dialkylamino, (xiii) phenyl wherein the phenyl ring is unsubstituted or substituted with a substituent selected from halo, loweralkyl, hydroxy, alkoxy and thioalkoxy, (xiv) phenylalkyl wherein the phenyl ring is unsubstituted or substituted as defined above, (xv) dialkylaminoalkyl, (xvi) alkoxy and (xvii) thioalkoxy;

$n$  is 1, 2 or 3;

$R_2$  is hydrogen or loweralkyl;

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R<sub>3</sub> is loweralkyl;

R<sub>4</sub> and R<sub>4a</sub> are independently selected from phenyl, thiazolyl and oxazolyl wherein the phenyl, thiazolyl or oxazolyl ring is unsubstituted or substituted with a substituent selected from

(i) halo, (ii) loweralkyl, (iii) hydroxy, (iv) alkoxy and (v) thioalkoxy;

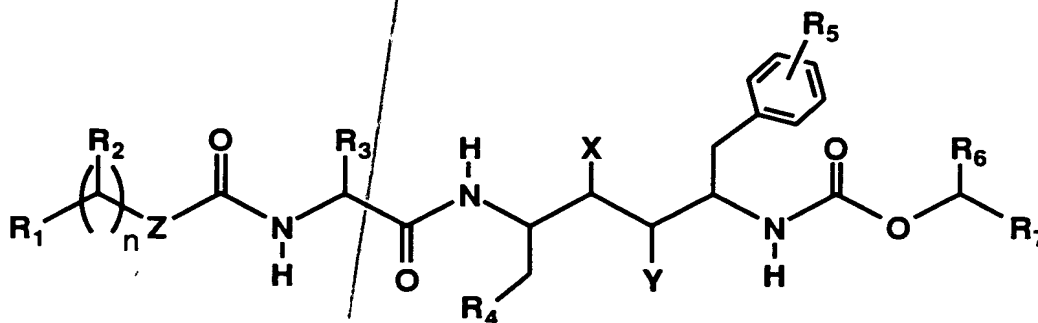
R<sub>6</sub> is hydrogen or loweralkyl;

R<sub>7</sub> is thiazolyl, oxazolyl, isoxazolyl or isothiazolyl wherein the thiazolyl, oxazolyl, isoxazolyl or isothiazolyl ring is unsubstituted or substituted with loweralkyl;

X is hydrogen and Y is -OH or X is -OH and Y is hydrogen, with the proviso that X is hydrogen and Y is -OH when Z is -N(R<sub>8</sub>)- and R<sub>7</sub> is unsubstituted and with the proviso that X is hydrogen and Y is -OH when R<sub>3</sub> is methyl and R<sub>7</sub> is unsubstituted; and

Z is absent, -O-, -S-, -CH<sub>2</sub>- or -N(R<sub>8</sub>)- wherein R<sub>8</sub> is loweralkyl, cycloalkyl, -OH or -NHR<sub>8a</sub> wherein R<sub>8a</sub> is hydrogen, loweralkyl or an N-protecting group; or a pharmaceutically acceptable salt, ester or prodrug thereof.

2. A compound of the formula:



wherein R<sub>1</sub> is monosubstituted thiazolyl, monosubstituted oxazolyl, monosubstituted isoxazolyl or monosubstituted isothiazolyl wherein the

substituent is selected from (i) loweralkyl, (ii) loweralkenyl, (iii) cycloalkyl, (iv) cycloalkylalkyl, (v) cycloalkenyl, (vi) cycloalkenylalkyl, (vii) heterocyclic wherein the heterocyclic is selected from aziridinyl, azetidiny, pyrrolidinyl, piperidinyl, piperazinyl, morpholinyl, thiomorpholinyl, thiazolyl, oxazolyl, isoxazolyl, isothiazolyl, pyridinyl, pyrimidinyl, pyridazinyl and pyrazinyl and wherein the heterocyclic is unsubstituted or substituted with a substituent selected from halo, loweralkyl, hydroxy, alkoxy and thioalkoxy, (viii) (heterocyclic)alkyl wherein heterocyclic is defined as above, (ix) alkoxyalkyl, (x) thioalkoxyalkyl, (xi) alkylamino, (xii) dialkylamino, (xiii) phenyl wherein the phenyl ring is unsubstituted or substituted with a substituent selected from halo, loweralkyl, hydroxy, alkoxy and thioalkoxy, (xiv) phenylalkyl wherein the phenyl ring is unsubstituted or substituted as defined above, (xv) dialkylaminoalkyl, (xvi) alkoxy and (xvii) thioalkoxy;

n is 1, 2 or 3;

R<sub>2</sub> is hydrogen or loweralkyl;

R<sub>3</sub> is loweralkyl;

R<sub>4</sub> is phenyl, thiazolyl or oxazolyl wherein the phenyl, thiazolyl or oxazolyl ring is unsubstituted or substituted with a substituent selected from (i) halo, (ii) loweralkyl, (iii) hydroxy, (iv) alkoxy and (v) thioalkoxy;

R<sub>5</sub> is hydrogen, halo, loweralkyl, hydroxy, alkoxy or thioalkoxy;

R<sub>6</sub> is hydrogen or loweralkyl;

R<sub>7</sub> is thiazolyl, oxazolyl, isoxazolyl or isothiazolyl wherein the thiazolyl, oxazolyl, isoxazolyl or isothiazolyl ring is unsubstituted or substituted with loweralkyl;

X is hydrogen and Y is -OH or X is -OH and Y is hydrogen, with the proviso that X is hydrogen and Y is -OH when Z is -N(R<sub>8</sub>)- and R<sub>7</sub> is unsubstituted

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and with the proviso that X is hydrogen and Y is -OH when R<sub>3</sub> is methyl and R<sub>7</sub> is unsubstituted;

Z is absent, -O-, -S-, -CH<sub>2</sub>- or -N(R<sub>8</sub>)- wherein R<sub>8</sub> is loweralkyl, cycloalkyl, -OH or -NHR<sub>8a</sub> wherein R<sub>8a</sub> is hydrogen, loweralkyl or an N-protecting group; or a pharmaceutically acceptable salt, ester or prodrug thereof.

3. The compound of Claim 2 wherein R<sub>1</sub> is monosubstituted thiazolyl or monosubstituted oxazolyl wherein the substituent is selected from (i) loweralkyl, (ii) loweralkenyl, (iii) cycloalkyl, (iv) cycloalkylalkyl, (v) cycloalkenyl, (vi) cycloalkenylalkyl, (vii) heterocyclic wherein the heterocyclic is selected from aziridinyl, azetidiny, pyrrolidinyl, piperidinyl, piperazinyl, morpholinyl, thiomorpholinyl, thiazolyl, oxazolyl, isoxazolyl, isothiazolyl, pyridinyl, pyrimidinyl, pyridazinyl and pyrazinyl and wherein the heterocyclic is unsubstituted or substituted with a substituent selected from halo, loweralkyl, hydroxy, alkoxy and thioalkoxy, (viii) (heterocyclic)alkyl wherein heterocyclic is defined as above, (ix) alkoxyalkyl, (x) thioalkoxyalkyl, (xi) alkylamino, (xii) dialkylamino, (xiii) phenyl wherein the phenyl ring is unsubstituted or substituted with a substituent selected from halo, loweralkyl, hydroxy, alkoxy and thioalkoxy, (xiv) phenylalkyl wherein the phenyl ring is unsubstituted or substituted as defined above, (xv) dialkylaminoalkyl, (xvi) alkoxy and (xvii) thioalkoxy; n is 1; R<sub>2</sub> is hydrogen; R<sub>4</sub> is phenyl or thiazolyl; R<sub>5</sub> is hydrogen; R<sub>6</sub> is hydrogen and R<sub>7</sub> is thiazolyl, oxazolyl, isothiazolyl or isoxazolyl.

4. The compound of Claim 2 wherein R<sub>1</sub> is 2-monosubstituted-4-thiazolyl or 2-monosubstituted-4-oxazolyl wherein the substituent is selected from (i) loweralkyl, (ii) loweralkenyl, (iii) cycloalkyl, (iv) cycloalkylalkyl, (v) cycloalkenyl, (vi) cycloalkenylalkyl, (vii) heterocyclic wherein the heterocyclic is selected from aziridinyl, azetidiny, pyrrolidinyl, piperidinyl, piperazinyl, morpholinyl, thiomorpholinyl, thiazolyl, oxazolyl, isoxazolyl, isothiazolyl, pyridinyl, pyrimidinyl, pyridazinyl and pyrazinyl and wherein the heterocyclic is unsubstituted or substituted with a substituent

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selected from halo, loweralkyl, hydroxy, alkoxy and thioalkoxy, (viii) (heterocyclic)alkyl wherein heterocyclic is defined as above, (ix) alkoxyalkyl, (x) thioalkoxyalkyl, (xi) alkylamino, (xii) dialkylamino, (xiii) phenyl wherein the phenyl ring is unsubstituted or substituted with a substituent selected from halo, loweralkyl, hydroxy, alkoxy and thioalkoxy, (xiv) phenylalkyl wherein the phenyl ring is unsubstituted or substituted as defined above, (xv) dialkylaminoalkyl, (xvi) alkoxy and (xvii) thioalkoxy; n is 1; R<sub>2</sub> is hydrogen; R<sub>4</sub> is phenyl; R<sub>5</sub> is hydrogen; R<sub>6</sub> is hydrogen and R<sub>7</sub> is 5-thiazolyl, 5-oxazolyl, 5-isothiazolyl or 5-isoxazolyl.

5. The compound of Claim 2 wherein R<sub>1</sub> is 2-monosubstituted-4-thiazolyl or 2-monosubstituted-4-oxazolyl wherein the substituent is loweralkyl; n is 1; R<sub>2</sub> is hydrogen; R<sub>4</sub> is phenyl; R<sub>5</sub> is hydrogen; R<sub>6</sub> is hydrogen; R<sub>7</sub> is 5-thiazolyl, 5-oxazolyl, 5-isothiazolyl or 5-isoxazolyl; and Z is -O- or -N(R<sub>8</sub>)- wherein R<sub>8</sub> is loweralkyl.

6. The compound of Claim 2 wherein R<sub>1</sub> is 2-monosubstituted-4-thiazolyl or 2-monosubstituted-4-oxazolyl wherein the substituent is ethyl or isopropyl; n is 1; R<sub>2</sub> is hydrogen; R<sub>3</sub> is methyl or isopropyl; R<sub>4</sub> is phenyl; R<sub>5</sub> is hydrogen; R<sub>6</sub> is hydrogen; R<sub>7</sub> is 5-thiazolyl, 5-oxazolyl, 5-isothiazolyl or 5-isoxazolyl; and Z is -O-.

7. The compound of Claim 2 wherein R<sub>1</sub> is 2-monosubstituted-4-thiazolyl or 2-monosubstituted-4-oxazolyl wherein the substituent is ethyl or isopropyl; n is 1; R<sub>2</sub> is hydrogen; R<sub>3</sub> is isopropyl; R<sub>4</sub> is phenyl; R<sub>5</sub> is hydrogen; R<sub>6</sub> is hydrogen; R<sub>7</sub> is 5-thiazolyl, 5-oxazolyl, 5-isothiazolyl or 5-isoxazolyl; Z is -N(R<sub>8</sub>)- wherein R<sub>8</sub> is methyl; X is hydrogen and Y is -OH.

8. (2S,3S,5S)-5-(N-(N-((N-Methyl-N-((2-isopropyl-4-thiazolyl)methyl)-amino)carbonyl)valinyl)amino)-2-(N-(((5-thiazolyl)methoxycarbonyl)amino)-1,6-diphenyl-3-hydroxyhexane; or a pharmaceutically acceptable salt, ester or prodrug thereof.

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9. (2S,3S,5S)-5-(N-(N-((N-Methyl-N-((2-isopropyl-4-oxazolyl)methyl)-amino)-carbonyl)valinyl)amino)-2-(N-((5-thiazolyl)methoxycarbonyl)amino)-1,6-diphenyl-3-hydroxyhexane; or a pharmaceutically acceptable salt, ester or prodrug thereof.

10. A compound selected from the group consisting of:

(2S,3S,5S)-5-(N-(N-((N-Methyl-N-((2-isopropyl-4-thiazolyl)methyl)-amino)carbonyl)alaninyl)amino)-2-(N-((5-thiazolyl)methoxycarbonyl)amino)-1,6-diphenyl-3-hydroxyhexane;

(2S,3S,5S)-5-(N-(N-((2-Isopropyl-4-thiazolyl)methoxycarbonyl)valinyl)amino)-2-(N-((5-thiazolyl)methoxycarbonyl)amino)-1,6-diphenyl-3-hydroxyhexane;

(2S,3S,5S)-2-(N-(N-((2-Isopropyl-4-thiazolyl)methoxycarbonyl)valinyl)amino)-5-(N-((5-thiazolyl)methoxycarbonyl)amino)-1,6-diphenyl-3-hydroxyhexane;

(2S,3S,5S)-5-(N-(N-((2-Isopropyl-4-thiazolyl)methoxycarbonyl)alaninyl)amino)-2-(N-((5-thiazolyl)methoxycarbonyl)amino)-1,6-diphenyl-3-hydroxyhexane;

(2S,3S,5S)-5-(N-(N-((2-(N,N-Dimethylamino)-4-thiazolyl)methoxycarbonyl)-valinyl)amino)-2-(N-((5-thiazolyl)methoxycarbonyl)amino)-1,6-diphenyl-3-hydroxyhexane;

(2S,3S,5S)-2-(N-(N-((2-(N,N-Dimethylamino)-4-thiazolyl)methoxycarbonyl)-valinyl)amino)-5-(N-((5-thiazolyl)methoxycarbonyl)amino)-1,6-diphenyl-3-hydroxyhexane;

(2S,3S,5S)-5-(N-(N-((2-(4-Morpholinyl)-4-thiazolyl)methoxycarbonyl)-valinyl)amino)-2-(N-((5-thiazolyl)methoxycarbonyl)amino)-1,6-diphenyl-3-hydroxyhexane;

(2S,3S,5S)-2-(N-(N-((2-(4-Morpholinyl)-4-thiazolyl)-methoxycarbonyl)valinyl)-amino)-5-(N-((5-thiazolyl)-methoxycarbonyl)amino)-1,6-diphenyl-3-hydroxyhexane;

(2S,3S,5S)-5-(N-(N-((2-(1-Pyrrolidinyl)-4-thiazolyl)methoxycarbonyl)-valinyl)amino)-2-(N-((5-thiazolyl)methoxycarbonyl)amino)-1,6-diphenyl-3-hydroxyhexane;

(2S,3S,5S)-5-(N-(N-((N-Methyl-N-((2-isopropyl-4-oxazolyl)methyl)amino)-carbonyl)valinyl)amino)-2-(N-((5-isoxazolyl)methoxycarbonyl)amino)-1,6-diphenyl-3-hydroxyhexane; or a pharmaceutically acceptable salt, ester or prodrug thereof.

[illegible]

wherein R<sub>1</sub> is monosubstituted thiazolyl, monosubstituted oxazolyl, monosubstituted isoxazolyl or monosubstituted isothiazolyl wherein the substituent is selected from (i) loweralkyl, (ii) loweralkenyl, (iii) cycloalkyl, (iv) cycloalkylalkyl, (v) cycloalkenyl, (vi) cycloalkenylalkyl, (vii) heterocyclic wherein the heterocyclic is selected from aziridinyl, azetidiny, pyrrolidinyl, piperidinyl, piperazinyl, morpholinyl, thiomorpholinyl, thiazolyl, oxazolyl, isoxazolyl, isothiazolyl, pyridinyl, pyrimidinyl, pyridazinyl and pyrazinyl and wherein the heterocyclic is unsubstituted or substituted with a substituent selected from halo, loweralkyl, hydroxy, alkoxy and thioalkoxy, (viii) (heterocyclic)alkyl wherein heterocyclic is defined as above, (ix) alkoxyalkyl, (x) thioalkoxyalkyl, (xi) alkylamino, (xii) dialkylamino, (xiii) phenyl wherein the phenyl ring is unsubstituted or substituted with a substituent selected

from halo, loweralkyl, hydroxy, alkoxy and thioalkoxy, (xiv) phenylalkyl wherein the phenyl ring is unsubstituted or substituted as defined above, (xv) dialkylaminoalkyl, (xvi) alkoxy and (xvii) thioalkoxy;

n is 1, 2 or 3;

R<sub>2</sub> is hydrogen or loweralkyl;

R<sub>3</sub> is loweralkyl;

R<sub>4</sub> and R<sub>4a</sub> are independently selected from phenyl, thiazolyl and oxazolyl wherein the phenyl, thiazolyl or oxazolyl ring is unsubstituted or substituted with a substituent selected from (i) halo, (ii) loweralkyl, (iii) hydroxy, (iv) alkoxy and (v) thioalkoxy;

R<sub>6</sub> is hydrogen or loweralkyl;

R<sub>7</sub> is thiazolyl, oxazolyl, isoxazolyl or isothiazolyl wherein the thiazolyl, oxazolyl, isoxazolyl or isothiazolyl ring is unsubstituted or substituted with loweralkyl;

X is -OH and Y is -OH; and

Z is absent, -O-, -S-, -CH<sub>2</sub>- or -N(R<sub>8</sub>)- wherein R<sub>8</sub> is loweralkyl, cycloalkyl, -OH or -NHR<sub>8a</sub> wherein R<sub>8a</sub> is hydrogen, loweralkyl or an N-protecting group; or a pharmaceutically acceptable salt, ester or prodrug thereof.

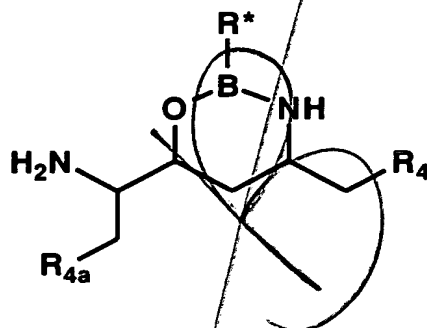
12. A method for inhibiting HIV protease comprising administering to a human in need thereof a therapeutically effective amount of a compound of any one of Claims 1-11.

13. A method for inhibiting HIV comprising administering to a human in need thereof a therapeutically effective amount of a compound of any one of Claims 1-11.



14. A pharmaceutical composition for inhibiting HIV protease comprising a pharmaceutical carrier and a therapeutically effective amount of a compound of any one of Claims 1-11.

15. A compound of the formula:

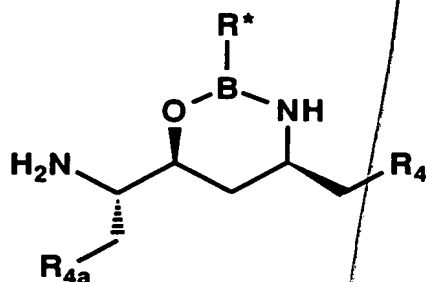


wherein R<sub>4</sub> and R<sub>4a</sub> are independently selected from phenyl, thiazolyl and oxazolyl wherein the phenyl, thiazolyl or oxazolyl ring is unsubstituted or substituted with a substituent selected from (i) halo, (ii) loweralkyl, (iii) hydroxy, (iv) alkoxy and (v) thioalkoxy; and R\* is loweralkyl, phenyl, halo-substituted phenyl, dihalo-substituted phenyl, alkoxy-substituted phenyl, loweralkyl-substituted phenyl, bis-trifluormethyl-substituted phenyl or naphthyl; or an acid addition salt thereof.

16. The compound of Claim 15 wherein R<sub>4</sub> and R<sub>4a</sub> are phenyl and R\* is phenyl.

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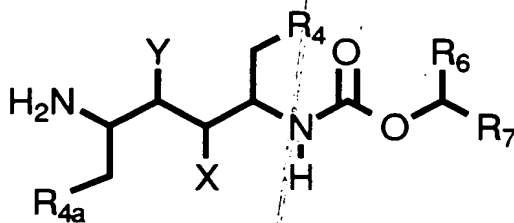
17. A compound of the formula:



wherein  $R_4$  and  $R_{4a}$  are independently selected from phenyl, thiazolyl and oxazolyl wherein the phenyl, thiazolyl or oxazolyl ring is unsubstituted or substituted with a substituent selected from (i) halo, (ii) loweralkyl, (iii) hydroxy, (iv) alkoxy and (v) thioalkoxy; and  $R^*$  is loweralkyl, phenyl, halo-substituted phenyl, dihalo-substituted phenyl, alkoxy-substituted phenyl, loweralkyl-substituted phenyl, bis-trifluormethyl-substituted phenyl or naphthyl; or an acid addition salt thereof.

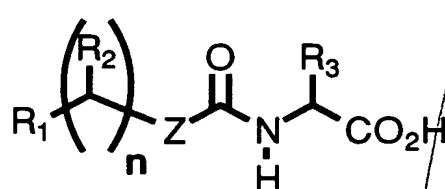
18. The compound of Claim 17  $R_4$  and  $R_{4a}$  are phenyl and  $R^*$  is phenyl.

19. A process for the preparation of a compound of any one of Claims 1-11 comprising (a) reacting a compound of the formula:

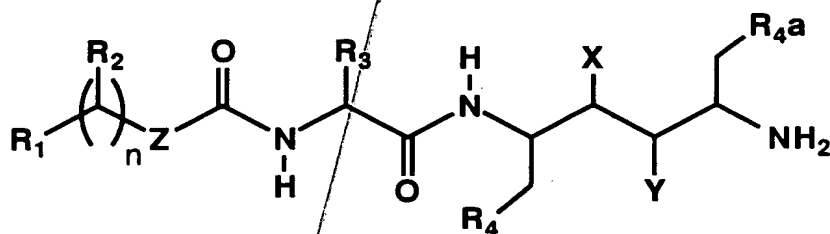


wherein  $R_4$ ,  $R_{4a}$ ,  $R_6$ ,  $R_7$ , X and Y are as defined therein with a compound of the formula:

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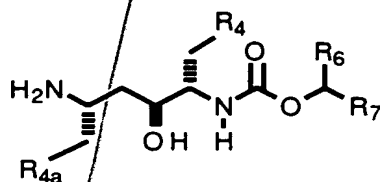


or an activated ester derivative thereof, wherein  $n$ ,  $R_1$ ,  $R_2$ ,  $Z$  and  $R_3$  are as defined therein; or (b) acylating a compound of the formula:



wherein  $n$ ,  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$ ,  $R_{4a}$ ,  $X$  and  $Y$  are as defined therein with a compound of the formula  $(R_6)(R_7)\text{CHOC(O)OL}$  wherein  $L$  is an activating group for the acylation reaction and wherein  $R_6$  is and  $R_7$  are defined as therein.

20. A process for the preparation of a compound of the formula:



wherein  $R_4$  and  $R_{4a}$  are independently selected from phenyl, thiazolyl and oxazolyl wherein the phenyl, thiazolyl or oxazolyl ring is unsubstituted or substituted with a substituent selected from (i) halo, (ii) loweralkyl, (iii) hydroxy, (iv) alkoxy and (v) thioalkoxy;

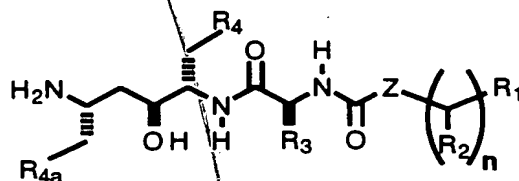
$R_6$  is hydrogen or loweralkyl; and

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N[C@H](R4)[C@H](O)CC[C@H](R4a)N

21. The process of Claim 20 wherein R<sub>4</sub> and R<sub>4a</sub> are phenyl and R\* is phenyl or R\*\* is isopropyl.

22. A process for the preparation of a compound of the formula:



wherein wherein R<sub>1</sub> is monosubstituted thiazolyl, monosubstituted oxazolyl, monosubstituted isoxazolyl or monosubstituted isothiazolyl wherein the substituent is selected from (i) loweralkyl, (ii) loweralkenyl, (iii) cycloalkyl, (iv) cycloalkylalkyl, (v) cycloalkenyl, (vi) cycloalkenylalkyl, (vii) heterocyclic wherein the heterocyclic is selected from aziridinyl, azetidiny, pyrrolidinyl, piperidinyl, piperazinyl, morpholinyl, thiomorpholinyl, thiazolyl, oxazolyl, isoxazolyl, isothiazolyl, pyridinyl, pyrimidinyl, pyridazinyl and pyrazinyl and wherein the heterocyclic is unsubstituted or substituted with a substituent selected from halo, loweralkyl, hydroxy, alkoxy and thioalkoxy, (viii) (heterocyclic)alkyl wherein heterocyclic is defined as above, (ix) alkoxyalkyl, (x) thioalkoxyalkyl, (xi) alkylamino, (xii) dialkylamino, (xiii) phenyl wherein the phenyl ring is unsubstituted or substituted with a substituent selected from halo, loweralkyl, hydroxy, alkoxy and thioalkoxy, (xiv) phenylalkyl wherein the phenyl ring is unsubstituted or substituted as defined above, (xv) dialkylaminoalkyl, (xvi) alkoxy and (xvii) thioalkoxy;

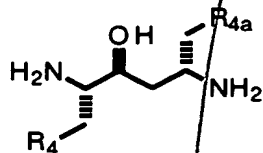
n is 1, 2 or 3;

R<sub>2</sub> is hydrogen or loweralkyl;

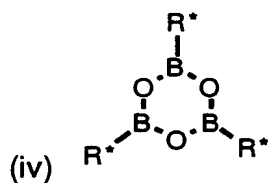
R<sub>3</sub> is loweralkyl; and

R<sub>4</sub> and R<sub>4a</sub> are independently selected from phenyl, thiazolyl and oxazolyl wherein the phenyl, thiazolyl or oxazolyl ring is unsubstituted or substituted with a substituent selected from

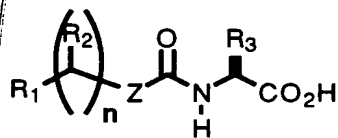
(i) halo, (ii) loweralkyl, (iii) hydroxy, (iv) alkoxy and (v) thioalkoxy; or an acid addition salt thereof, comprising (a) reacting a compound of the formula:



wherein  $R_4$  and  $R_{4a}$  are defined as above with (i)  $R^*B(OH)_2$ , (ii)  $B(OR^{**})_3$ , (iii)  $B(R^{***})_3$  or



wherein  $R^*$  is phenyl, halo-substituted phenyl, dihalo-substituted phenyl, alkoxy-substituted phenyl, loweralkyl-substituted phenyl, bis-trifluormethyl-substituted phenyl or naphthyl or loweralkyl,  $R^{**}$  is loweralkyl and  $R^{***}$  is halo, followed by (b) reacting the product of step (a) with a compound of the formula:



or an activated ester derivative thereof, wherein  $R_1$ ,  $R_2$ ,  $R_3$ ,  $Z$  and  $n$  are defined as above.

23. The process of Claim 22 wherein  $R_4$  and  $R_{4a}$  are phenyl and  $R^*$  is phenyl or  $R^{**}$  is isopropyl.